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**ANNUAL PROGRESS REPORT
TUBERCULOSIS IN UTAH
FIVE YEAR STATISTICAL REVIEW 1998-2002**

Total Cases

Thirty-one active cases of tuberculosis (TB) were reported in Utah in 2002, a 11% decrease from the 35 cases reported in 2001. There were 49 cases reported in 2000, 40 in 1999, and 52 in 1998.

Comment: The state of Utah has had an average of 41 cases of active TB reported each year between 1998 and 2002 (range: 31 - 52).

Case Rates

The 2002 TB case rate was 1.3 per 100,000 persons, a decrease from 1.6 per 100,000 persons in 2001. The case rate for 2000 was 2.3 per 100,000 persons, for 1999 was 1.9 per 100,000 persons, and for 1998 was 2.5 per 100,000 persons. (The case rates were calculated using population estimates from the Utah Department of Health's Indicator Based Information System.)

Comment: The state of Utah has had an average of 1.9 cases of tuberculosis per 100,000 persons between 1998 and 2002 (range: 1.3 - 2.5 cases per 100,000 persons). Utah's case rate is lower than the most recently reported tuberculosis case rate for the entire U.S. of 5.6 cases per 100,000 persons in 2001 (CDC. *Reported Tuberculosis in the United States, 2001*.).

Site of Disease

In 2002, the percentage of TB cases with pulmonary disease alone was 55% (17 of 31 cases). An additional 13% (4 of 31) had pulmonary and extrapulmonary involvement; the remaining 32% (10 of 31 cases) had only extrapulmonary disease. The percentage of TB cases with pulmonary disease alone was 66% (23 of 35 cases) in 2001, 69% (34 of 49) in 2000 and 58% (23 of 40) in 1999. An additional 14% (5 of 35 cases) in 2001, 8% (4 of 49) in 2000 and 13% (5 of 40) in 1999 had both pulmonary and extrapulmonary involvement; 80% (28 of 35 cases) in 2001, 77% (38 of 49) in 2000 and 70% (28 of 40) in 1999 had some pulmonary involvement. The remaining 20% (7 of 35 cases) in 2001, 23% (11 of 49) in 2000 and 30% (12 of 40) in 1999 had only extrapulmonary disease. Pulmonary disease was recognized in 67% (35 of 52) of 1998 cases and extrapulmonary disease was diagnosed in 33% (17 of 52) of 1998 cases. (Prior to 1999, persons with TB were classified as having either pulmonary or extrapulmonary disease; there was no third category for persons having both types of disease.)

Comment: A five year average cannot be calculated for the site of disease (i.e., pulmonary versus extrapulmonary disease) because two different counting methods were used, one for 1998 and a second for 1999-2002. In 2001, 73% of the tuberculosis cases in the entire U.S. were pulmonary, 20% were extrapulmonary, and 8% had both pulmonary and extrapulmonary disease (CDC. *Reported Tuberculosis in the United States, 2000*1.).

Gender

During 2002, 55% (17 of 31) of persons with TB in Utah were male, and 45% (14 of 31) were female. In 2001, 69% (24 of 35) of persons with TB were male, and 31% (11 of 35) were female. In 2000, 69% (34 of 49) of persons with TB were male, and 31% (15 of 49) were female. In 1999, 63% (25 of 40) of persons with TB were male, and 37% (15 of 40) were female. In 1998, 56% (29 of 52) were male, and 44% (23 of 52) were female.

Comment: Males account for more of Utah's TB morbidity than females. Over the past five years, males have accounted for an average of 62% of cases each year, while females have accounted for 38%. This is similar to the distribution of TB cases by gender for the entire U.S. in 2001 where 62% of the reported

cases occurred in males and 38% occurred in females (CDC. *Reported Tuberculosis in the United States, 2001.*).

Age

In 2002, 6% (2 of 31) of persons with TB in Utah were children 0-14 years of age. This is a decrease from 2001 where 9% (3 of 35) of persons with TB were children 0-14 years of age. In 2000, 2% (1 of 49) of persons with TB were children 0-14 years of age. In 1999, 8% (3 of 40) of persons with TB were children 0-14 years of age, and in 1998, 4% (2 of 52) of persons with TB were in this age group. In 2002, 81% (25 of 31) of persons with TB in Utah were between 15-64 years of age. This is an increase from 2001 where 74% (26 of 35) of persons with TB were between 15-64 years of age. In 2000, 82% (40 of 49) of persons with TB were between 15-64 years of age. In 1999, 62% (25 of 40) of persons with TB were 15-64 years of age, and in 1998, 73% (38 of 52) of persons with TB were in this age group. In 2002, 13% (4 of 31) of persons with TB in Utah were 65 years of age or older. This is a decrease from 2001 where 17% (6 of 35) of persons with TB in Utah were 65 years of age or older. In 2000, 16% (8 of 49) of persons with TB were 65 years of age or older. In 1999, 30% (12 of 40) of persons with TB were 65 years of age or older, and in 1998, 23% (12 of 52) of persons with TB were in this age group and.

Comment: The percentage of Utah's TB cases in persons 0-14 years of age for the five-year period of 1998-2002 ranged from 2% to 9%, with an average of 6%. Persons 15-64 years of age accounted for 63% to 82% of Utah's TB cases, with a five-year average of 75%. Persons 65 years of age and older accounted for 13% to 30% of Utah's TB cases, with a five-year average of 20%. The age distribution of TB cases in Utah is similar to that for the entire U.S. in 2001 where 6% of the cases reported occurred in persons 0-14 years of age, 73% occurred in persons 15-64 years of age, and 21% occurred in persons 65 years of age and older (CDC. *Reported Tuberculosis in the United States, 2001.*).

Race/Ethnicity

In 2002, 42% (13 of 31) of persons with TB in Utah were White, non-Hispanic. This is an increase from 2001 where 29% (10 of 35) of persons with TB were White, non-Hispanic. White, non-Hispanic persons accounted for 45% (22 of 49) of Utah's TB cases in 2000, 30% (12 of 40) in 1999, and 33% (17 of 52) in 1998. In 2002, 3% (1 of 31) of persons with TB in Utah were Black, non-Hispanic. This is a decrease from 2001 where 11% (4 of 35) of persons with TB were Black, non-Hispanic. Black, non-Hispanic persons accounted for 10% (5 of 49) of Utah's TB cases in 2000, 8% (3 of 40) in 1999, and 6% (3 of 52) in 1998. In 2002, 10% (3 of 31) of persons with TB in Utah were Native American/Alaskan. This is an increase from 2001 where 6% (2 of 35) of Utah's TB were Native Americans/Alaskan Natives. Native Americans/Alaskan Natives accounted for none (0 of 49) of Utah's TB cases in 2000, 17% (7 of 40) in 1999, and 8% (4 of 52) in 1998. In 2002, 19% (6 of 31) of persons with TB in Utah were Asian/Pacific Islanders. This is an increase from 2001 where 17% (6 of 35) of persons with TB in Utah were Asian/Pacific Islanders. Asian/Pacific Islanders accounted for 14% (7 of 49) of Utah's TB cases in 2000, 25% (10 of 40) in 1999, and 36% (19 of 52) in 1998. In 2002, 26% (8 of 31) of persons with TB in Utah were of Hispanic ethnicity. This is a decrease from 2001 where 37% (13 of 35) of persons with TB were of Hispanic ethnicity. Persons of Hispanic ethnicity accounted for 31% (15 of 49) of Utah's TB cases in 2000, 20% (8 of 40) of cases in 1999, and 17% (9 of 52) of cases in 1998.

Comment: White, non-Hispanic persons accounted for an average of 36% of Utah's TB morbidity for the five year period of 1998-2002 (range: 29% - 45%). Black, non-Hispanic persons accounted for an average of 8% of Utah's TB morbidity (range: 3% - 11%); Native Americans/Alaskan Natives accounted for an average of 8% of morbidity (range: 0% - 17%); Asian/Pacific Islanders accounted for an average of 22% of morbidity (range: 14% - 36%); and, persons of Hispanic ethnicity accounted for an average of 26% of morbidity (range: 17% - 37%). During four of the last five years, there has been an increase in the number

of persons of Hispanic ethnicity with TB in Utah. Part of this increase can be explained by better targeted testing projects in Utah.

The racial/ethnic distribution of TB morbidity for the entire U.S. in 2001 was as follows: 21% of cases occurred in White, non-Hispanic persons, 30% occurred in Black, non-Hispanic persons, 1% occurred in Native Americans/Alaskan ethnicity Natives, 22% occurred in Asian/Pacific Islanders, and 25% occurred in persons of Hispanic (CDC. *Reported Tuberculosis in the United States, 2001.*).

Foreign-born Population

In 2002, 68% (21 of 31) of persons with TB in Utah were born outside of the U.S.. This is an increase from 2001 where 63% (22 of 35) of persons with TB were born outside of the U.S.. Persons born outside of the

U.S. accounted for 55% (27 of 49) of the TB cases in 2000, 50% (20 of 40) in 1999, and 60% (31 of 52) in 1998.

Comment: In the last five years, half or more of the persons diagnosed with TB in Utah were born outside of the U.S.. This is consistent with other state trends in the rest of the United States. The number of states with at least 50% of their annual TB cases among the foreign-born increased from 4 in 1992 to 21 in 2000 (CDC. *MMWR, February 8, 2002/51(05):101-4.*). In 2001, 49% of the persons with TB in the U.S. were born in the U.S., 49% were born outside of the U.S., and 2% were of unknown status. (CDC. *Reported Tuberculosis in the United States, 2001.*). These numbers show the importance of effectively screening and treating individuals from high TB prevalence areas.

Residence

In 2002, 84% (26 of 31) of persons with TB in Utah were living in a private residence at the time of their diagnosis. This is similar to 2001 where 86% (30 of 35) of persons with TB were living in a private residence at the time of their diagnosis. In 2000, 76% (37 of 49) of persons with TB were living in a private residence at the time of their diagnosis, 83% (33 of 40) in 1999, and 81% (42 of 52) of persons in 1998. In 2002, 10% (3 of 31) of the persons with TB in Utah were homeless. This percentage is a decrease from 2001 when 14% (5 of 35) of the persons with TB were homeless. Homeless persons accounted for 16% (8 of 49) of Utah's TB morbidity in 2000, 13% (5 of 40) in 1999, and 15% (8 of 52) in 1998. In 2002, there were no cases of TB in Utah in a correctional facility at the time of their diagnosis. There were also no cases of TB in a correctional facility for 2001. Persons incarcerated in correctional facilities accounted for 4% (2 of 49) of Utah's TB morbidity in 2000, 3% (1 of 40) in 1999, 2% (1 of 52) in 1998. In 2002, there were no persons with TB in Utah living in a long term care facility at the time of their diagnosis. This is a decrease from 2001 when 4% (2 of 35) of persons in Utah were living in a long term care facility at the time of their diagnosis. Persons living in long term care facilities accounted for 4% (2 of 49) of Utah's TB morbidity in 2000, 3% (1 of 40) in 1999, and 2% (1 of 52) in 1998. In 2002, there was one case (1 of 31) of TB in the Missionary Training Center in Provo, Utah. No persons with TB in Utah for the years 1998-2002 were reported to be in a drug treatment center, juvenile detention center, or Job Corps facility at the time of their diagnosis with the exception of one case (1 of 35) in 2001 who was a client of a methadone treatment center.

Comment: The majority of persons with TB were living in a primary residence at the time of their diagnosis for the years 1998-2002. The five-year average was 82%. From 1998-2002, an average of 14% of persons with TB was homeless at the time of their diagnosis, 2% were living in a correctional facility, and 3% were living in a long term care facility.

Reported at Death

In 2002, there were no cases of persons with TB in Utah who had their disease initially reported at their death. This is a decrease from 2001 when 3% (1 of 35) of the persons with TB had their disease initially

reported at their death. Persons with TB who had their disease initially reported at their death accounted for 2% (1 of 49) in 2000, 10% (4 of 40) in 1999, and no cases (0 of 52) in 1998.

Comment: From 1998-2002, 3% of the persons with TB in Utah had their disease initially reported at their death.

HIV Prevalence

In 2002, there were no cases of TB in Utah co-infected with human immunodeficiency virus (HIV). This is a decrease from 2001 where 6% (2 of 35) of the persons with TB were co-infected with HIV. In 2000, 6% (3 of 49) of persons with TB were co-infected with HIV, 8% (3 of 40) in 1999, and 8% (4 of 52) in 1998.

Comment: Persons with TB who were co-infected with HIV have accounted for 0% to 8% of Utah's TB morbidity each year from 1998-2002, with a five-year average of 6%. The number of persons in the United States with TB who are co-infected with HIV is not available for 2001. In 2000, 9% of persons with TB in the U.S. were co-infected with HIV (CDC. *Reported Tuberculosis in the United States, 2001.*).

Drug Sensitivity Testing

Of the 31 cases of tuberculosis reported in Utah in 2002, 77% (24 of 31) were confirmed by laboratory culture; the remaining 23% (7 of 31) were verified by a physician's diagnosis. This is the same percentage in 2001 where 77% (27 of 35) of tuberculosis cases were confirmed by laboratory culture, and 23% (8 of 35) were verified by a physician's diagnosis. In 2000, 88% (43 of 49) of TB cases in Utah were confirmed by laboratory culture, and 12% (6 of 49) were verified by a physician's diagnosis. In 1999, 45% (18 of 40) of TB cases were confirmed by laboratory culture, and 55% (22 of 40) were verified by a physician's diagnosis. In 1998, 92% (48 of 52) of TB cases were confirmed by laboratory culture, and 8% (4 of 52) were verified by a physician's diagnosis.

Drug sensitivity testing was performed on the initial specimen isolates for 96% (23 of 24) of the positive cultures in 2002. Sensitivity testing was also performed on 100% (27 of 27) of the isolates from 2001, 100% (43 of 43) of the isolates from 2000, 100% (18 of 18) of the isolates from 1999, and 100% (48 of 48) of the isolates from 1998.

Comment: The majority of Utah's TB cases were confirmed by laboratory culture for every year between 1998 and 2002 except 1999. Of those cases confirmed by laboratory culture, 100% of the isolates were tested for drug sensitivity with the exception of one isolate in 2002. Drug sensitivity was not performed on this isolate due to rapid overgrowth of bacteria other than *M. tuberculosis*.

Drug Sensitivity Results

In 2002, 22% (5 of 23) of persons with TB in Utah in which drug sensitivity testing was performed had organisms that were resistant to one or more of the antituberculosis medications. All five of the organisms were resistant to one drug: three were resistant to streptomycin (SM), one to isoniazid (INH), and one to pyrazinamide (PZA). There were no cases of organisms resistant to multiple drugs. The percentage of people with TB who have organisms resistant to one or more antituberculosis medications in 2002 has decreased from 2001 where 30% (8 of 27) of people with TB had organisms that were resistant to one or more medications. In 2001, five of the organisms were resistant to one drug: three were resistant to streptomycin (SM) and two to pyrazinamide (PZA). Two of the organisms were resistant to two drugs: one was resistant to SM and isoniazid (INH) and one to SM and ethambutol (EMB)(classified as borderline drug resistant for EMB). One of the organisms was resistant to three drugs: SM, INH, and EMB. In 2000, 24% (12 of 49) of Utah's TB cases had organisms with resistance to at least one drug, 18% (7 of 40) of cases in 1999, and 12% (6 of 52) of cases in 1998.

From 1998-2002, there was identified in 2000 one person with TB whose initial culture isolates had resistance to both INH and RIF. One unusual extrapulmonary case was described in 1998. The initial isolate was cultured from ascites fluid, and this isolate was sensitive to all five first-line tuberculosis drugs

(INH, RIF, PZA, SM and EMB). In 1999, the same individual developed pulmonary symptoms. A sputum specimen obtained from this person had organisms that were resistant to both INH and RIF. This individual was treated for a total of 16 months. In 2002, this person's pulmonary TB reactivated. Two different sputum specimens from this individual contained organisms that were only resistant to INH.

Comment: Over the five-year period, 1998-2002, there has been a gradual increase in the number of culture isolates obtained from TB cases that have resistance to one or more antituberculosis medications relative to the total number of TB culture isolates (Chi-square for linear trend = 3.2; p value = 0.08). This troubling statistic highlights the need for continued drug sensitivity testing for all TB culture isolates, and the need for thorough follow-up of all TB patients to ensure that they take all their medicine as prescribed to treat their disease.

Directly Observed Therapy

In 2002, 94% (29 of 31) of persons with TB in Utah who were eligible to receive antituberculosis medications were provided directly observed therapy (DOT). This percentage is an increase from 2001 where 91% (30 of 33) of persons with TB who were eligible to receive antituberculosis medications were provided DOT. In 2000, 92% (44 of 48) of persons with TB were provided DOT, 80% (32 of 36) in 1999, and 60% (31 of 52) in 1998.

Health District Distribution

In 2002, 81% (25 of 31) of the persons with TB in Utah were residing in one of the four major metropolitan counties in the state (i.e., Salt Lake, Utah, Davis and Weber Counties). This is decrease from 2001 where 94% (33 of 35) of persons with TB were living in one of the four metropolitan counties. In 2000, 92% (45 of 49) of the TB cases lived in one of these counties, 90% (36 of 40) in 1999, and 88% (46 of 52) in 1998. Utah's non-metropolitan counties (i.e., all counties except Salt Lake, Utah, Davis and Weber Counties) were home to 19% (6 of 31) of the persons with TB in Utah in 2002, 6% (2 of 35) in 2001, 8% (4 of 49) in 2000, 10% (4 of 40) in 1999, and 12% (6 of 52) in 1998.

Comment: The majority of Utah's TB morbidity occurs in its four major metropolitan counties, where 76% of the state's population resided in 2001 (according to population estimates from the Utah Department of Health's Action 2000 Health Information System). The five-year average (from 1998-2002) of Utah's TB morbidity in these four counties is 89% (range: 81% to 94%).

TB Suspects

In addition to the 31 reported cases of TB in Utah in 2002, there were 103 persons reported with suspect TB. Ten of these 103 persons were diagnosed with TB, but they were not Utah residents. In 2001, 138 individuals were reported with suspect TB, 105 were reported in 2000, 81 were reported in 1999, and 67 were reported in 1998.

Comment: There has been an increase in the number of persons reported with suspect TB relative to the number of persons reported with true TB disease in Utah from 1998 to 2002 (Chi-square for trend = 18.7; p value < 0.01). This is a positive trend because it indicates that health care providers may be considering TB as a possible diagnosis more often; therefore, fewer true TB cases are likely to be mis-diagnosed. However, this increase in suspect TB cases also means that increased public health resources from both the state and local health departments have been needed to evaluate suspect cases.

B1 / B2 Notifications

In 2002, one international refugee who moved to Utah was identified with Class B-1 TB, and 6 were identified with Class B-2 TB (7 total). This is an 81% decrease from 2001 where 5 persons were identified with Class B-1 TB, and 36 were identified with Class B-2 TB (41 total). A classification of B-1 means that the person has clinically active, non infectious TB, and a B-2 classification means the person has an abnormal x-ray but does not have clinically active TB. In 2000, there were 4 persons identified with Class

B-1 TB and 14 with Class B-2 TB (18 total); in 1999, there were 14 persons identified with Class B-1 TB and 27 with Class B-2 TB (41 total); and, in 1998, there were 17 individuals identified with Class B-1 TB and 46 identified with Class B-2 TB (63 total). All individuals identified with Class B-1 or Class B-2 TB were referred to the local health department within whose jurisdiction they would have been residing for further evaluation.

Comment: Over the five-year period of 1998-2002, 41 international refugees moving to Utah were identified with Class B-1 TB and 129 were identified with Class B-2 TB, for a combined total of 170 persons. Except for 2001, there has been a decrease each year from 1998-2002 in the number of refugees who were moving to Utah and were identified with Class B-1 or B-2 TB: there were 63 in 1998, 41 in 1999, 18 in 2000, 41 in 2001, and seven in 2002. The very small number of refugee arrivals with Class B-1 or B-2 TB in 2001 is a result of the decrease in total refugee arrivals to the United States in 2001.

From 1998-2002 there were a total 170 refugees with Class B-1 or B-2 TB. An evaluation for Active TB Disease was completed on each of the refugees. As a result of this evaluation one Class B refugee was identified with Active TB Disease.

Average Cost of Anti Tuberculosis Medications for Persons with TB

From January through December 2002, a total of \$21,980.55 was spent by the Tuberculosis Program on active cases for anti tuberculosis medications. This figure does not include money spent on testing and treatment for persons with latent TB infection. A typical patient with active TB that was susceptible to all first-line anti tuberculosis medications required six months of directly observed therapy for a total pharmacy cost of \$478.80.

Comment: This represents a substantial change over that calculated for previous years, primarily because the Program was able to more accurately track the cost and movement of TB medication through the pharmacy database. It should be noted that the cost of medication is only part of the total cost of treating

active TB. Other costs not considered here include nursing time spent providing DOT, the cost of the clinical evaluations (including laboratory tests), and administrative costs.

TB in Utah Compared to Other States

According to *Reported Tuberculosis in the United States, 2001* (CDC, August 2001), Utah was ranked number 45 out of the 50 states for its tuberculosis case rate. Utah's case rate in 2000 was 1.5 cases per 100,000 persons and the national case rate was 5.6 cases per 100,000 persons (As calculated by the Utah DOH, Utah's case rate for 2001 was 1.6 cases per 100,000 persons; this difference is most likely due to different sources for Utah's population). Utah ranked fourth in the nation for persons with TB who were homeless within the past 12 months (14% of persons with TB in Utah in 2001 were homeless compared to 6% for the entire U.S.; 10% of persons with TB in Utah in 2002 were homeless). Utah ranked third in the nation for percentage of cases with a history of injecting drug use. The percentage of persons with TB in Utah in 2001 who reported injecting drug use was 6%, and the national average was 2%. In 2002, there were no persons with TB in Utah reporting injecting drug use. Utah ranked lower than the national average in 2001 for the percentage of TB cases in persons who reported non-injecting drug use: 3% of persons with TB in Utah reported non-injecting drug use compared to 7% for the entire U.S. In 2002, 3% (1 of 31) of persons with TB reported non-injecting drug use. Utah shared the national average of TB cases in persons who reported excess alcohol use: 15% of persons with TB in Utah and the entire U.S. reported excess alcohol use in 2001. The percentage of persons with TB in Utah who reported excess

alcohol use decreased to 3% in 2002. For all of 2002, there was only one of the thirty-one cases (3%) of persons with TB that reported substance abuse, and this one case involved both alcohol use and non-injecting drug use.

Trends

A growing area of concern in Utah for TB control is the increasing number of dialysis patients with active TB disease. In 2002, 6.5% (2 of 31) of cases with active TB disease in Utah had end stage renal disease (ESRD) and were receiving dialysis. This is similar to 2001, where 5.7% (2 of 35) of cases with active TB disease had ESRD and were receiving dialysis. Patients with TB and ESRD often require drug therapy for a longer duration and can experience complications during treatment, and there is the concern of spreading TB in the dialysis centers to fellow immunosuppressed patients. In Utah there are 22 Medicare-certified dialysis facilities as of December 31, 2001. These facilities treated 937 dialysis patients in 2001, an increase of 8.6% from 2000 (information found at www.esrdnetworks.org/networks/net15/utah.htm).